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REMARKS

The Applicants appreciate the Examiner's thorough examination of the subject application. Applicants request reconsideration of the subject application based on the following remarks.

Claims 1, 2, and 4-6 were rejected under 35 U.S.C. §103(a) as being allegedly unpatenable over Hirata et al (U.S. Patent 5,872,611) in view of Colgan (U.S. Patent 6,256,080).

Claims 7-14 were rejected under 35 U.S.C. §103(a) as being allegedly unpatenable over Hirata et al (U.S. Patent 5,872,611) in view of Colgan (U.S. Patent 6,256,080) as applied to claims 1, 2, and 4-6 above, and further in view of Numano (U.S. Patent 6,313,898).

For the sake of brevity, the two § 103 rejections are addressed in combination. Such a combined response is considered appropriate because *inter alia* each of the rejections relies on the Hirata as the primary citation in view of Colgan as a supporting citation. Each of the rejections is traversed.

The present invention provides in claim 1 a vertical alignment mode liquid crystalline display apparatus in which

- "the volume excluding member being provided so as to be at least a portion of one side edge of the at least one electrode"
- "the liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy" and
- "the liquid crystal molecules are tilted in a uniform direction from the at least one side edge of the at least one electrode to an opposite edge when a voltage is applied to the at least one electrode."

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These features of the instant invention provide high contrast and fast response with minimal or no occurrence of disclination lines because random orientation of the liquid crystal is prevented (See, page 24 lines 11-23). Naturally, some disclination lines occur around the volume excluding member, which is situated to minimize disclination in the pixel portion. However the location of the volume excluding member is located on at least a portion of one side edge of the electrode such that a portion of disclination lines due to the volume excluding member is located in a pixel portion corresponding to the electrode, and another portion thereof is located in a non-pixel portion not corresponding to the electrode.

Accordingly, in the present claim 1, there is less influence with respect to the pixel portion contribution to display.

None of the cited references teach or suggest the above features of claim 1.

The Office Action has averred that the "low-permittivity insulating film" of Hirata corresponds to "volume excluding member" of claim 1. However, as the reference is understood, Hirata appears to teach that the low-permittivity insulating film is provided in the center of the pixel electrode as seen in Figures 27 and 28 of Hirata. Thus, the LCD apparatus of Hirata is expected that have disclination lines in the vicinity of the center of the pixel electrode due to the placement the occur around the low-permittivity insulating film.

The Office Action has further averred that the dashed rectangles of the Figure of Hirata correspond to volume excluding members provided so as to be on at least a portion of one side of edge of an electrode. However, as the reference is understood, the dashed rectangles of Figure 26 represent slit-like openings 48, and do not correspond to a low-permittivity insulating film 47 as suggested in the Office Action. (Column 19, lines 30-34 of Hirata).

Therefore, the invention recited in the present claim 1 has an advantage over Hirata regarding display quality and contrast. Specifically, in both the cases of shielding the pixel region due to disclination lines the invention recited in the present claim 1 has an advantage over

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Hirata regarding pixel aperture ratio. Furthermore, as described in the present specification, the disclination lines prohibit response of liquid crystal molecules, thus prohibiting a high response. The present invention overcomes the detrimental effects of declination lines with the vertical mode LCD display apparatus provided by claim 1. The present invention recited in the present claim 1 has an advantage over Hirata in the response speed of the liquid crystal molecules in an entire pixel portion.

Colgan merely teaches a liquid crystalline display device operating in a vertical alignment mode (VA mode) where liquid crystal molecules are aligned roughly vertically, and rotate around a horizontal axis under the influence of an applied field, so as to switch between a vertical and horizontal orientation as shown in Fig. 3 of Colgan.

Therefore, even if Hirata is combined with Colgan, one having ordinary skill in the art can not obtain a vertical alignment mode liquid crystal display apparatus according to the invention recited in the present claim 1.

Claim 4 provides a related vertical alignment mode liquid crystalline display apparatus which have substantially the same features as the apparatus of claim 1 except that the apparatus of claim 4 further comprises a plurality of volume excluding members. For at least the reasons discussed *supra* in relation to claim 1, the rejection of claim 4 should be withdrawn.

Now referring to Claim 7, said claim provides vertical alignment mode liquid crystal display apparatus which have a feature that "when voltage is not applied to the at least one electrode, the liquid crystal molecules in the at least one pixel portion are oriented in a vertical alignment and the liquid crystal molecules in the non-pixel portion are oriented in a uniaxial horizontal alignment."

The above feature of claim 7 results in a prevention of generation in declination lines themselves at the time of response of the liquid crystal molecules. Specifically disclination lines

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are not generated irrespective of a pixel portion or a non-pixel portion, and as a result high speed response can be realized in the liquid crystal.

None of the references cited by the Office Action, taken alone or in combination, teach or suggest the above feature of claim 7.

Numano teaches that liquid crystal molecules substantially orient a horizontal alignment in both a pixel portion and a non-pixel portion, while the pretilt direction of the pixel portion is different from the pretilt direction of the non-pixel portion.

Numano does not recite a mechanism for orienting the liquid crystal molecules in embodiment 3 and Figure 11. However, with reference to orientation of liquid crystal molecules obtained in another embodiment of Numano and the description "a light alignment function, i.e., an organic thin film having the alignment function of the liquid crystal in a direction corresponding to the light polarizing direction of the illuminated ultraviolet ray is used for alignment film," (Column 11, lines 43-46 of Numano), it is thought that the liquid crystal molecules orient a substantially horizontal alignment with pretilt in both the pixel portion and the non-pixel portion.

As such, Numano does not teach or suggest the different alignment in the pixel portion and the non-pixel portion when no voltage is applied, therefore, an arrangement of the invention recited in claim 7 is different for that recited by Numano.

Moreover, the LCD device apparatus recited by Numano provides an intermediate region between pixels to prevent disclination line generated reverse tilt regions from entering the pixel region. Thus, Numano can remove disclination lines from a pixel portion, but retain disclination lines in the non-pixel portion irrespective of whether or not a voltage is applied. Such disclination lines prohibit response of the liquid crystal molecules, and as a result high response is suppressed.

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Therefore, even if Numano is combined with the Hirata and Colgan references as applied to claims 1, 2, and 4-6, one having ordinary skill in the art can not obtain a vertical alignment mode liquid crystal display apparatus according to the invention recited in the present claim 7.

Thus, for at least the reasons discussed *supra*, the claims as amended, which provide a vertical alignment mode LCD apparatuses would not have been obvious to one skilled in the art based on any combination of Hirata, Colgan, and/or Numano. Therefore, claims 1, 4, and 7 are patentable over any combination of Hirata, Colgan, and/or Numano. Claims 2, 4-6, and 8-14 depend from one of claims 1, 4, and 7 and are therefore also patentable over any combination of Hirata, Colgan, and/or Numano.

Claims 1, 2, and 4-6 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Colgan (U.S. Patent 6,256,080) in view of Hirata et al (U.S. Patent 5,872,611).

Claims 7-14 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Colgan (U.S. Patent 6,256,080) in view of Hirata et al (U.S. Patent 5,872,611), and further in view of Numano (U.S. Patent 6,313,898).

For the sake of brevity, the two § 103 rejections are addressed in combination. Such a combined response is considered appropriate because *inter alia* each of the rejections relies on the Colgan as the primary citation in view of Hirata as a supporting citation. Each of the rejections is traversed.

As the Office Action is understood, although the ordering of the documents has been reversed, i.e., Colgan in view of Hirata or Colgan in view of Hirata in view of Numano, the alleged teachings of the references is substantially the same as the rejections asserted in sections 1 and 2 of the office action. Thus, the claims as presently amended are patentable over any combination of the cited documents for at least the same reasons discussed *supra*.

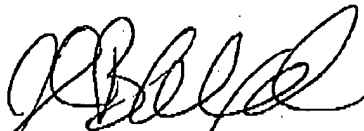
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More particularly claims 1, 4, and 7, which provide a vertical alignment mode LCD apparatuses, would not have been obvious to one skilled in the art based on any combination of Hirata, Colgan, and/or Numano. Therefore, claims 1, 4, and 7 are patentable over any combination of Hirata, Colgan, and/or Numano. Claims 2, 4-6, and 8-14 depend from one of claims 1, 4, and 7 and are therefore also patentable over any combination of Hirata, Colgan, and/or Numano.

Although it is not believed that any additional fees are needed to consider this submission, the Examiner is hereby authorized to charge our deposit account no. 04-1105 should any fee be deemed necessary.

Respectfully submitted,

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